Date: October 28, 1981

Subject: Primary Process R & D - Tucson
Monthly Report - October, 1981

From/Location: E. L. Cambridge

To/Location: J. G. Kaufman

BASIC RESOURCES RESEARCH

General

A preliminary relevance tree analysis has confirmed that an alumina from clay process conforms more to the company's strategic, tactical and operational goals than does Bayer technology. As a result, we have identified various overall processing alternatives to go from kaolin to aluminum metal using both the Alcoa Smelting Process and Hall-Heroult technologies as the reduction step. We are currently evaluating these alternatives on the basis of energy consumption and identifying the key unresolved technical questions.

Anaconda Clay Process

Preliminary experiments indicate that it may be possible to remove product alumina impurities to acceptable levels by an acid wash after a single crystallization step. Further confirmatory work is required but, if this proves feasible, the second crystallizer could be removed resulting in significant reductions in overall energy and capital cost.

An experimental set-up is being assembled to try to duplicate a recent Commonwealth Scientific and Industrial Research Organization patent for production of anhydrous $AlCl_3$. Calculations predict a somewhat lower energy consumption than the Alcoa chlorination process using the Anaconda Clay Process as a front end.

AD-105 Process

A report by Tom Bolles entitled "Initial Laboratory Tests of the AD-105 Ammonoalunite Process" will be issued next week. Conditions for ammonoalunite precipitation and methods for impurity removal were investigated.

An initial energy balance for the process was formulated using the METSIM computer program. The predicted energy requirement was midway between the Anaconda Clay Process and best available Bayer technology, with the autoclave step consuming 66% of the overall energy. Alternative process conditions are being investigated which potentially could reduce energy requirements to about the same level as the best available Bayer process.

REDUCTION RESEARCH

AD-108 Composite Anode Process

Furnaces for baking composite anodes and for a small electrolysis cell are under construction. The press and sigma-blade mixer should be installed in the fire-assay lab next week allowing actual experimentation to begin in about two weeks. We are still waiting for installation of a ventilation system and further power but will start experimentation with a temporary set-up.

Potlining Disposal/Reclamation

Based on an extensive literature search, John Snodgrass has drafted a report outlining potentially available technologies for treatment of spent potlining. We will use this report to plan our research program in this area.

Contacts with Alcan have continued. They have reiterated their interest in carrying out a joint preliminary investigation in this area. A kick-off meeting is tentatively scheduled for November 24 in Montreal or Louisville.

DEVELOPMENT AND TECHNICAL SERVICES

Pot Magnetics

The ASV contract was finalized. We can expect recommendations from them by year end.

Petroleum Pitch

A meeting was held on October 6 in Columbia Falls to discuss the use of petroleum pitch as anode binder material. The Columbia Falls laboratory will perform tests in an effort to predict the effects petroleum pitch will have on Sumitomo anode quality. The results of this test will be presented at the January Anode Technology Committee meeting in Tucson.

New X-Ray Method

The results of Mike Schneller's two weeks of intense activity in Columbia Falls are encouraging. At this time, no major roadblocks exist for project completion. Final results will become available after a minimum of four x-ray analyses by each method. A final report should be available before the end of this year.

Arco Fines

Sebree has successfully mixed, pressed and baked eighty-seven test anodes using sixteen tons of Arco Fines as a substitute for the

normal ball-mill fraction. Although they had difficulties getting the material introduced into the system because of "caking", the fines flowed through the downstream conveyor, storage and feeder systems with no problems. The plan is to test the anodes in the potlines with results by mid December.

Lithium Fluoride

At this writing, the four Sebree lithium fluoride pots are unstable and operating at low efficiencies. The primary problem is maintaining sufficient liquid bath volumes at the target ratio, lithium and voltage points. Efforts are being made to bring the bath system to equilibrium by melting the excess crust and sidewall buildup and by increasing the target ratio.

Columbia Falls is making preliminary investigations into the possible use of lithium.

Ft. Meade Aluminum Fluoride

Greg Atkison and Jim Stone have been assigned by Sebree management to conduct a study of the performance of Ft. Meade Aluminum Fluoride in the Sebree material handling, dry scrubber and potline systems. The test should be under way within two months.

PERSONNEL

- Dr. Raouf O. Loutfy, Senior Scientist - Reduction reported on October 1.
- Dr. Subodh K. Das, Research Consultant reported on October 16.
- Mr. Paul P. Russell, Staff Process Engineer reported on October 21.
- Dr. Daniel M. Blake, Senior Scientist - Alumina will report on October 30.
- We have posted a position for an additional technician in the Reduction area and anticipate filling this position locally by mid-November.
- APS posting procedures for a Research Engineer/Scientist in both the Reduction and Carbon group have been initiated. We will concurrently advertise externally. An APS posting will also be placed for a second process engineer in the Development and Technical Services group for early 1982.

OTHER

- The Fire Assay Lab is now available to us. However, a permanent power supply and ventilation system are still outstanding items.

- A fixed fee contract for $29,000 to provide a ± 10% cost estimate, detailed engineering drawings and a construction bid package for our Carbon and Reduction Research Facility was let to Pace Construction of Tucson. The cost estimate is due on November 23 which should allow completion and submission of the AFE as scheduled.

  Alusuisse have indicated that they could provide special purpose test equipment for the Carbon lab. However at this stage, we are awaiting clarification of scope and details. We have initiated specification proceedings and United States vendor contacts as an alternative to the Alusuisse route.

E. L. CAMBRIDGE

ELC:pm

cc: R.W.Bartlett
File: 0.8.1